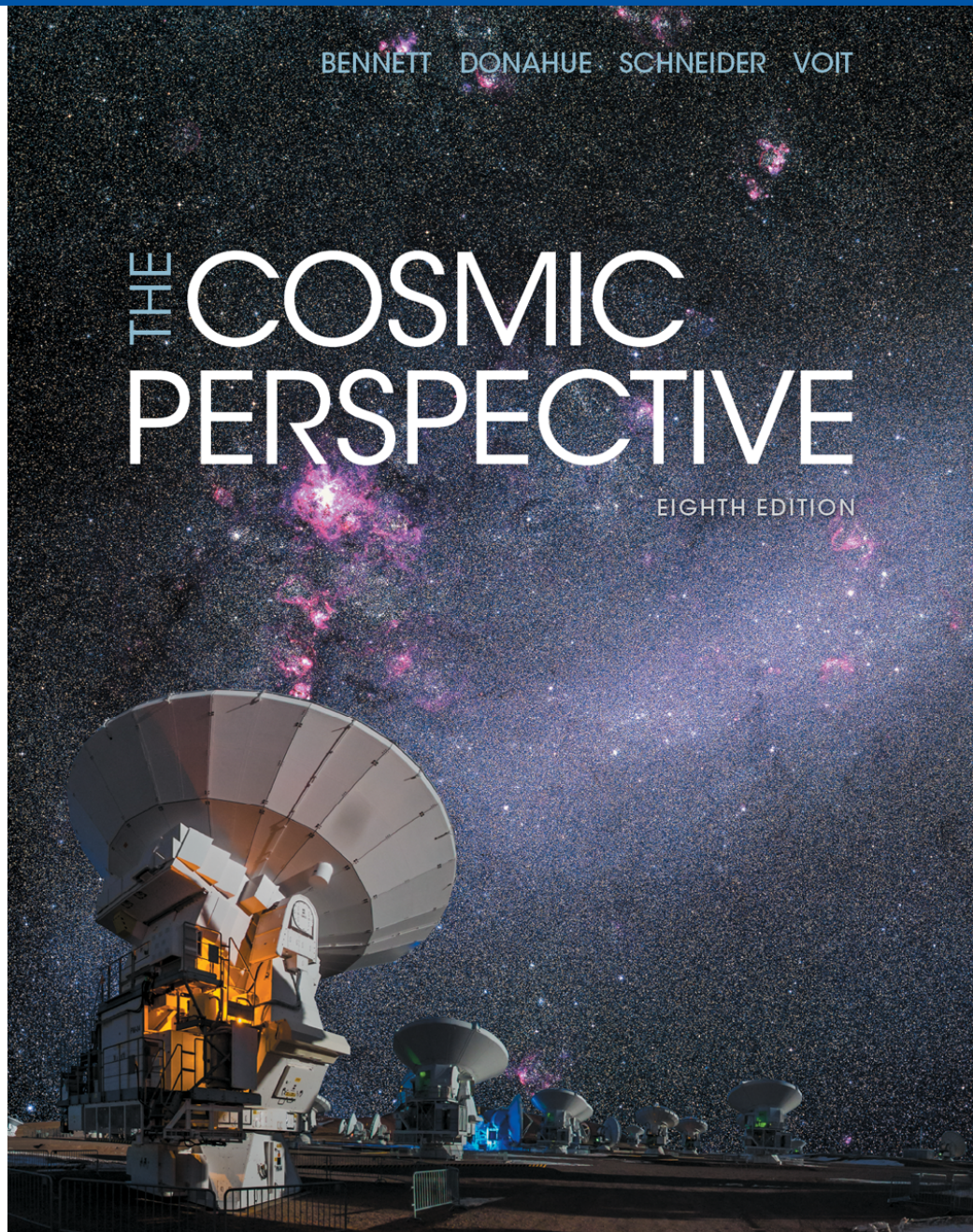
Review Clickers

Chapter 12: Asteroids, Comets, and Dwarf Planets: Their Natures, Orbits, and Impacts



© 2017 Pearson Education, Inc.

Asteroids

a) are rocky and small–typically the size of a grain of rice or a marble.
b) are rocky, with a wide range of sizes, up to hundreds of miles in diameter.
c) have only thin atmospheres.
d) are made mostly of metals.
e) are mostly found in the inner solar system.

© 2017 Pearson Education, Inc.

Asteroids

a) are rocky and small–typically the size of a grain of rice or a marble.

b) are rocky, with a wide range of sizes, up to hundreds of miles in diameter.

c) have only thin atmospheres.

d) are made mostly of metals.

e) are mostly found in the inner solar system.

© 2017 Pearson Education, Inc.

If you keep pushing a person on a swing with little pushes, at *just the right frequency*, they will swing very high. This is an example of

a) Newton's second law.
b) Newton's first law.
c) energy conservation.
d) resonance.
e) conservation of angular momentum.

© 2017 Pearson Education, Inc.

If you keep pushing a person on a swing with little pushes, at *just the right frequency*, they will swing very high. This is an example of

a) Newton's second law.
b) Newton's first law.
c) energy conservation.
d) resonance.
e) conservation of angular momentum.

Credit: Edd Prince / Wikimedia

© 2017 Pearson Education, Inc.

Orbits of asteroids in the asteroid belt

a) often intersect the orbits of the planets.
b) are mostly between Mars and Jupiter.
c) are grouped into patterns by resonances with Jupiter.
d) are mostly inside the *frost line*.
e) all except A

© 2017 Pearson Education, Inc.

Orbits of asteroids in the asteroid belt

a) often intersect the orbits of the planets.
b) are mostly between Mars and Jupiter.
c) are grouped into patterns by resonances with Jupiter.
d) are mostly inside the *frost line*.
e) all except A

© 2017 Pearson Education, Inc.

What is the best way to find the mass of an asteroid?

a) Look at its spectrum.
b) Study a sample of its matter.
c) Find an asteroid with a moon and use Kepler's 3rd law.
d) none of the above

© 2017 Pearson Education, Inc.

What is the best way to find the mass of an asteroid?

a) Look at its spectrum.

b) Study a sample of its matter.

c) Find an asteroid with a moon and use Kepler's 3rd law.

d) none of the above

$$\frac{R^3}{p^2} = \frac{G(M+m)}{4\pi^2} \simeq \frac{GM}{4\pi^2}$$

- M: asteroid's mass
- m: moon's mass
- R: distance between asteroid & Moon
- p: orbital period of moon

M *much* greater than m

© 2017 Pearson Education, Inc.

Most meteorites come from

a) stars.
b) destroyed planets.
c) asteroids.
d) the Moon and Mars.
e) material ejected from volcanoes.

© 2017 Pearson Education, Inc.

Most meteorites come from

a) stars.
b) destroyed planets.
c) asteroids.
d) the Moon and Mars.
e) material ejected from volcanoes.

© 2017 Pearson Education, Inc.

Primitive meteorites

a) are approximately 4.6 billion years old.
b) give us clues to what the early solar system was like.
c) represent samples of shattered worlds.
d) all of the above
e) A and B

© 2017 Pearson Education, Inc.

Primitive meteorites

a) are approximately 4.6 billion years old.
b) give us clues to what the early solar system was like.
c) represent samples of shattered worlds.
d) all of the above
e) A and B

© 2017 Pearson Education, Inc.

Processed meteorites

a) are meteorites that have been altered in a lab for study.
b) come from a parent body that was large enough to develop a core and mantle.
c) may be metallic or rocky.
d) all of the above
e) B and C

© 2017 Pearson Education, Inc.

Processed meteorites

a) are meteorites that have been altered in a lab for study.
b) come from a parent body that was large enough to develop a core and mantle.
c) may be metallic or rocky.
d) all of the above
e) B and C

© 2017 Pearson Education, Inc.

Comets

a) formed from planetesimals in the inner part of the early solar system.
b) formed from planetesimals in the outer part of the early solar system.
c) orbit the Sun and return time after time, for billions of years.
d) have a single tail that streams out straight behind them.

© 2017 Pearson Education, Inc.

Comets

a) formed from planetesimals in the inner part of the early solar system.

b) formed from planetesimals in the outer part of the early solar system.

c) orbit the Sun and return time after time, for billions of years.

d) have a single tail that streams out straight behind them.

© 2017 Pearson Education, Inc.

The *nucleus* of a comet

a) is made of rock.
b) is made of dust and ice, like a dirty snowball.
c) releases gas when the comet nears the Sun.
d) All of the above
e) B and C

© 2017 Pearson Education, Inc.

The *nucleus* of a comet

a) is made of rock.
b) is made of dust and ice, like a dirty snowball.
c) releases gas when the comet nears the Sun.
d) All of the above
e) B and C

© 2017 Pearson Education, Inc.

If Earth passed through the tail of a comet, what would happen?

a) People would die from the gasses such as methane and ammonia.
b) Earth would be bombarded by large impactors.
c) Earth might be knocked out of its orbit or its axis might get tilted.
d) A meteor shower would occur.

© 2017 Pearson Education, Inc.

If Earth passed through the tail of a comet, what would happen?

a) People would die from the gasses such as methane and ammonia.
b) Earth would be bombarded by large impactors.
c) Earth might be knocked out of its orbit or its axis might get tilted.
d) A meteor shower would occur.

Credit: NYTimes & Bettmann

© 2017 Pearson Education, Inc.

Why is there a meteor shower *every year* on Aug. 10, 11, and 12?

a) Meteorites only enter the solar system on certain dates.
b) Meteorites often have 1 year orbital periods.
c) Earth passes through the orbit of a comet and hits the remaining debris at the same time each year.
d) none of the above

© 2017 Pearson Education, Inc.

Why is there a meteor shower *every year* on Aug. 10, 11, and 12?

a) Meteorites only enter the solar system on certain dates.
b) Meteorites often have 1 year orbital periods.
c) Earth passes through the orbit of a comet and hits the remaining debris at the same time each year.
d) none of the above

© 2017 Pearson Education, Inc.

What is *plasma* (in astronomy)?

a) an element commonly found in space
b) a constituent of blood
c) an ionized or charged gas made when atoms lose one or more electrons
d) another name for the solar wind

© 2017 Pearson Education, Inc.

What is *plasma* (in astronomy)?

a) an element commonly found in space
b) a constituent of blood
c) an ionized or charged gas made when atoms lose one or more electrons
d) another name for the solar wind

© 2017 Pearson Education, Inc.

Why do comet tails always point away from the Sun?

a) They are left behind as the comet moves.
b) Newton's third law: If the comet goes one way, the tail must go the other way.
c) The solar wind blows them away from the Sun.
d) They don't; this is just a perspective effect of how we view them.

© 2017 Pearson Education, Inc.

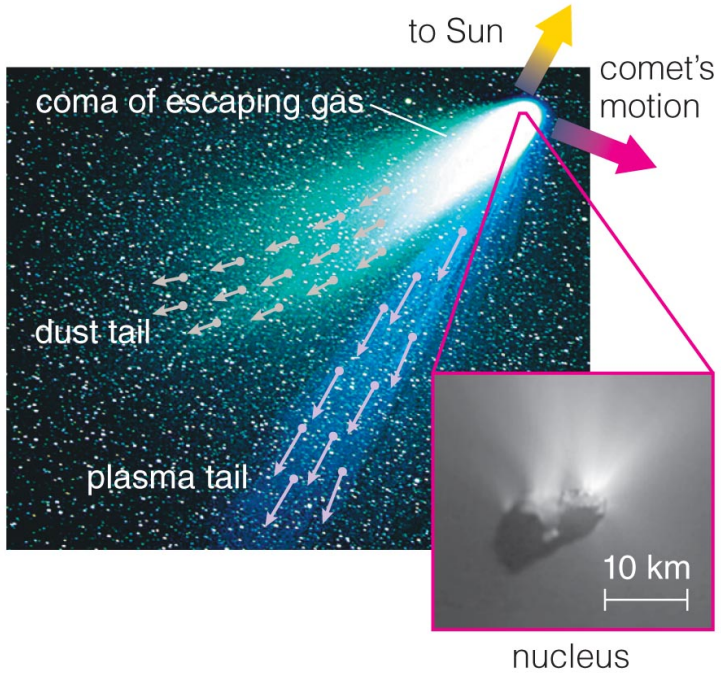
Why do comet tails always point away from the Sun?

a) They are left behind as the comet moves.

b) Newton's third law: If the comet goes one way, the tail must go the other way.

c) The solar wind blows them away from the Sun.

d) They don't; this is just a perspective effect of how we view them.



b Anatomy of a comet. The larger image is a ground-based photo of Comet Hale-Bopp. The inset shows the nucleus of Halley's Comet photographed by the *Giotto* spacecraft.

© 2017 Pearson Education, Inc.

Every time a comet gets near the Sun, some of its material streams away in the tail. Shouldn't all comets be gone?

a) yes
b) no, not that much material vaporizes
c) yes, but there are more comets stored in "deep freeze" beyond Pluto
d) not yet, but they will all be gone sometime in the near future

© 2017 Pearson Education, Inc.

Every time a comet gets near the Sun, some of its material streams away in the tail. Shouldn't all comets be gone?

a) yes

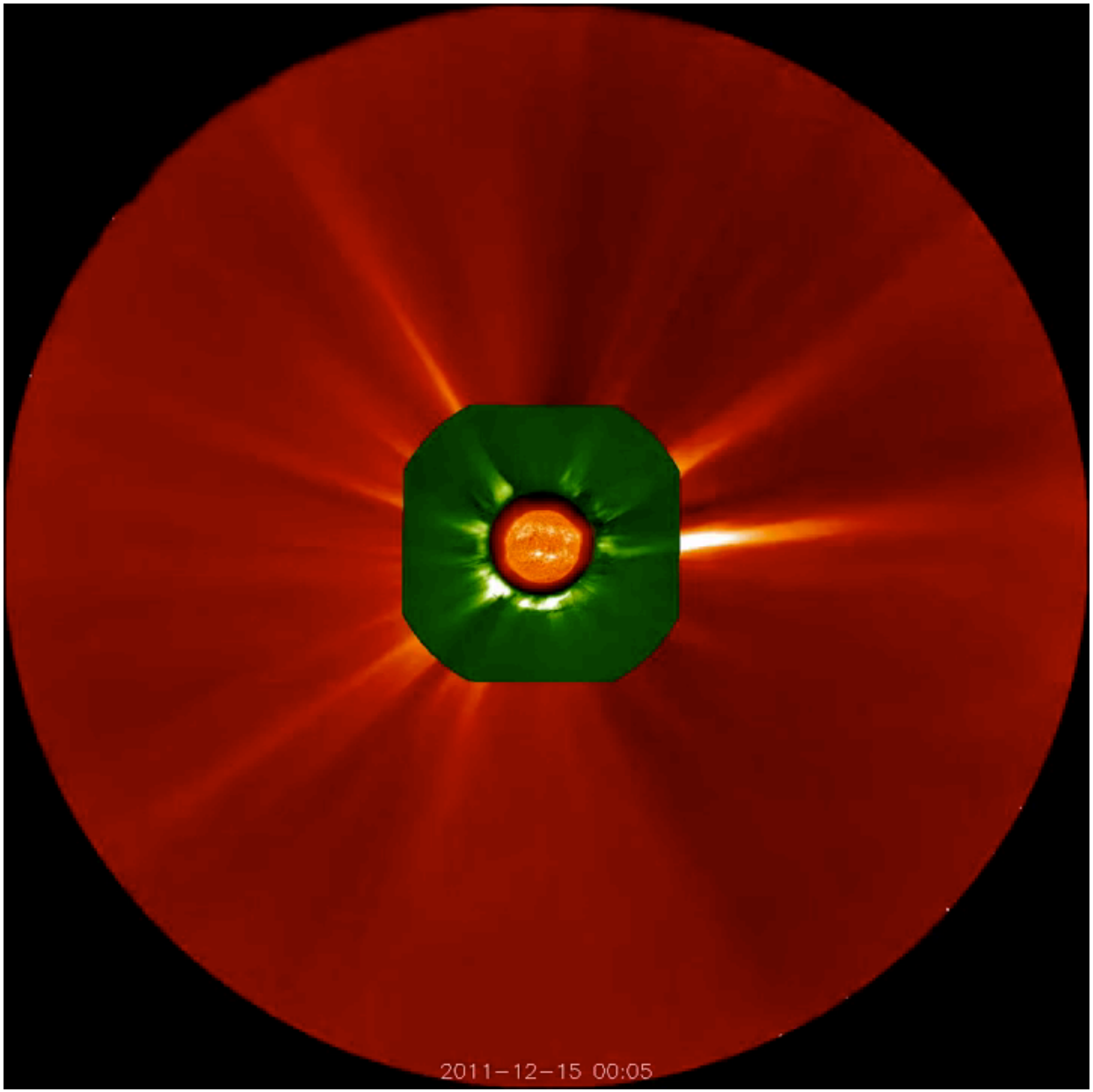
b) no, not that much material vaporizes

c) yes, but there are more comets stored in "deep freeze" beyond Pluto

d) not yet, but they will all be gone sometime in the near future

© 2017 Pearson Education, Inc.

Comet Lovejoy cruises around the Sun



Source: NASA / SDO

What do astronomers think Pluto is?

a) a major planet
b) a large Kuiper belt comet
c) an escaped moon of Neptune
d) an asteroid

© 2017 Pearson Education, Inc.

What do astronomers think Pluto is?

a) a major planet
b) a large Kuiper belt comet
c) an escaped moon of Neptune
d) an asteroid

© 2017 Pearson Education, Inc.

Why do some comets come from far out in space and from all different directions (i.e., not in the plane of the solar system)?

a) They come from other solar systems.
b) They come from nebulae in interstellar space.
c) They come from a giant spherical cloud called the Oort cloud.
d) They come from the Kuiper belt when a comet is flung out by Neptune's gravity.

© 2017 Pearson Education, Inc.

Why do some comets come from far out in space and from all different directions (i.e., not in the plane of the solar system)?

a) They come from other solar systems.

b) They come from nebulae in interstellar space.

c) They come from a giant spherical cloud called the Oort cloud.

d) They come from the Kuiper belt when a comet is flung out by Neptune's gravity.

© 2017 Pearson Education, Inc.

About how often is it estimated that an asteroid or comet impacts Earth with sufficient energy to cause mass extinction?

a) once a millennium
b) once every million years
c) once every hundred million years
d) once in Earth's history

© 2017 Pearson Education, Inc.

About how often is it estimated that an asteroid or comet impacts Earth with sufficient energy to cause mass extinction?

a) once a millennium
b) once every million years
c) once every hundred million years
d) once in Earth's history

© 2017 Pearson Education, Inc.

Would it be plausible to discover that a small asteroid orbiting within the asteroid belt has an active volcano?

a) Plausible. Several small objects in the solar system have active volcanoes.
b) Plausible. Several asteroids are known to be composed of basaltic material (lava).
c) Implausible. Only planets, not moons or asteroids, have volcanoes.
d) Implausible. Asteroids are too small to be geologically active this late in the solar system evolution.

© 2017 Pearson Education, Inc.

Would it be plausible to discover that a small asteroid orbiting within the asteroid belt has an active volcano?

a) Plausible. Several small objects in the solar system have active volcanoes.
b) Plausible. Several asteroids are known to be composed of basaltic material (lava).
c) Implausible. Only planets, not moons or asteroids, have volcanoes.
d) Implausible. Asteroids are too small to be geologically active this late in the solar system evolution.

© 2017 Pearson Education, Inc.